Building Regulations Part L & F Briefing

November 2018

1 - INTRODUCTION

§1.1 - Government has announced that it intends to review Part L of the Building Regulations in the winter of 2018/9[1]. This was first included in the Clean Growth Strategy in October 2017, subject to the outcome of the Independent Review of Building Regulations and Fire Safety, which reported in May 2018. As part of its Industrial Strategy Grand Challenges, Government has also set the ambition to "at least halve the energy use of new buildings by 2030"[2].

§1.2 - Beyond these statements of intent however, it has not formally announced such a review and what its scope will be.

§1.3 - CIBSE would like the upcoming review of Building Regulations to be as well-informed and effective as possible. We have therefore been consulting with members and the wider industry on changes they would like to see, and the speed with which these should be implemented. This paper expresses CIBSE's recommendations for Government, informed by views from members received at workshops held on 2nd October 2018 (CIBSE event) and on 18th October 2018 (with the London Energy Transformation Initiative) and through separate communications.

§1.4 - In addition to essential issues to be addressed now, it includes issues which we recommend government to start to address now in readiness for the next review, expressed as:

- Immediate-term: this review i.e. 2019 implementation
- Medium term: 2nd review, and possibly also the 3rd
- Long-term: 3rd or 4th review – by 2030.

§1.5 - This paper therefore provides both immediate recommendations for the anticipated review, and a forward programme for the evolution of Building Regulations Part L and Part F (and associated Approved Documents) towards the targets set out in longer term policy statements and the requirements of future Carbon Budgets as set in accordance with the Climate Change Act.

2 - GENERAL RECOMMENDATIONS

§2.1 - **There is a real and general need for better enforcement of Building Regulations, regardless of what the requirements are; this requires better training and resources for Building Control Bodies.** CIBSE have highlighted this on numerous occasions in the past, and we are therefore not expanding on it here but this by no means diminishes the importance of this recommendation, which has been supported by numerous reports and industry bodies.

§2.2 – We would recommend a **gradual move to operational performance**, rather than design- and as-built submissions. In addition to the obvious benefits of improving actual performance, this would allow project teams to **focus on the best solutions to achieve the desired outcome** instead of being subject to the constraints and loopholes of particular methodologies. This could encourage simpler and more effective approaches, as well as innovation in design and processes. In the medium- to long term, this should lead to a holistic design approach considering thermal comfort, air quality, daylight, energy use and carbon emissions. We recognise that this is currently outside the scope of Building Regulations, which apply up to handover, but this transition is essential if we are to move to buildings that are genuinely delivering low or zero carbon outcomes, rather than promises.

[1] See for example Parliamentary Briefing "Energy Efficiency and the Clean Growth Strategy", June 2018; and page 13 of Clean Growth Strategy: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

[2] May 2018 https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/missions

3 – ENERGY AND CARBON

3.1 - CONTEXT

§3.1.1 - CIBSE are very aware that Government already face pressing demands for regulatory reform post-Grenfell, which could involve substantial resources. Action to reduce carbon emissions from the built environment is nonetheless identified as one of the Grand Challenges, aiming to halve the energy use by new buildings, and this action is urgently needed. This summer's report by the Committee on Climate Change[3] highlights the relatively limited progress on cutting carbon emissions from buildings, and the need for much more significant improvements in order for the buildings sector to contribute to the UK carbon target (beyond the savings achieved through decarbonisation of the grid). The latest Special Report 15 by the International Panel on Climate Change[4] ("1.5°C report") further stresses the need for urgent and immediate action to achieve drastic cuts to carbon emissions.

3.2 – RECOMMENDATIONS

§3.2.1 - CIBSE believe the **current approach in Building Regulations Part L does not deliver sufficient reductions in carbon emissions** in practice. This is due to a large number of factors, and we therefore recommend an **overall review of the requirements and methodology**.

§3.2.2 - Our recommendations are summarised below, grouped under:

- Metrics to express the requirements of Building Regulations Part L
- Setting targets
- Checking compliance.

§3.2.3 - In addition, we would recommend a review of approaches adopted in other countries, particularly the implementation of the Energy Performance of Buildings Directive (EPBD) by other EU Member States, to gather lessons on the most effective approaches to deliver energy and carbon reduction in practice (i.e. notional building or set target; energy or carbon metrics etc). Much comparative work has already been undertaken through the Concerted Action programme, and the reports of these studies are available to the public as well as to Member States. CIBSE are also well-connected with their European counterparts and would be happy to assist MHCLG on this.

METRICS

§3.2.4 - Part L should introduce **energy targets in combination with carbon targets.** We think the ideal energy target should be expressed as metered energy consumption. We appreciate there are other possible approaches (e.g. using primary energy, as required by the 2018 revision of the Energy Performance of Buildings Directive), but they all have pros and cons. Using metered energy would have the significant benefits of being directly relatable for the consumer and of allowing easy comparisons over time, irrespective of future changes to the carbon content of the gas and electricity grids. In the case of heating energy, this should be done in conjunction with efficiency requirements (fabric and systems) to ensure the right incentives are in place to reduce demand in the first place (as buildings with heat pumps would otherwise in theory be able to comply without having to achieve similar reductions in end-use energy demand, for the same metered energy consumption) – see also §3.2.10 and §3.2.16. An approach based on metered energy use would also require metering of energy generated on site, whether or not it is required for feed-in tariff purposes or any other incentive scheme.

§3.2.5 – Regulations should increasingly encourage **demand management**. We are aware that there are a number of considerations that need to be taken into account before demand management is introduced into regulations however it is a very important part of delivering carbon reductions and

[3] CCC 2018 Progress Report, June 2018 https://www.theccc.org.uk/publication/reducing-uk-emissions-2018-progress-report-to-parliament/
[4] IPCC "1.5oC report", October 2018 http://www.ipcc.ch/report/sr15/

meeting demand at the building- and, importantly, at the system level. We do not think it would be appropriate to set limits in terms of peak demand, but we think there should be a review of how this could be encouraged, at least for new buildings to enable demand management (e.g. smart meters, large plant items which can be linked to demand management), alongside mechanisms outside of the Building Regulations (e.g. financial incentives through energy suppliers). This would not prevent more restrictive requirements to gradually be introduced in Building Regulations overtime if deemed appropriate.

SETTING TARGETS

§3.2.6 - There should be a **tightening of requirements** for new buildings and for works to existing buildings subject to Building Regulations, in order to deliver increased energy and carbon savings in line with the UK's carbon targets (see also §3.1.1), and do so more consistently. In addition to new buildings, there should be a greater focus on the requirements to reduce energy consumption in existing buildings whenever any significant work is carried out on them that falls within the scope of controlled work under Building Regulations.

§3.2.7 - The current approach to targets based on a **notional building** is not sufficiently effective. We acknowledge there are pros and cons to other approaches, however we think there are significant drawbacks to the notional building approach (see details in §3.3.3 to §3.3.7) and therefore recommend reviewing whether **other approaches to target-setting** could be adopted; in the first stage this could be offered as alternative compliance route to the notional building, at least in some sectors. Broadly speaking there are three possible approaches:

- §3.2.8 - **Whole-building target set using a notional building:** in kWh/m^2/yr and kgCO^2/m^2/yr: this approach has fundamental limitations, in particular around not encouraging the consideration of strategic passive design decisions such as building form and servicing strategies (see details in §3.3.3 to §3.3.7). These are very important shortcomings if energy consumption, peak demand, and carbon reductions are to be achieved in real terms. It is possible this may be improved to some extent by reviewing how the notional building is set – see some suggestions in section 3.3, which we recommend to be reviewed as very minimum first steps. However, we also recommend reviewing alternatives in parallel, as outlined below.
- §3.2.9 - **Whole-building targets per building type:** in kWh/m^2/yr and kgCO^2/m^2/yr. We recommend considering the adoption of this approach to set a clearer path towards the end goal of zero carbon buildings. The targets could be set **incrementally tighter along a known and clear direction of travel** between the current practice and the longer-term desired outcome (e.g. reaching "zero-carbon new buildings" by 2030 could require 3 increments). In the immediate term, there may already be sufficient data and precedents in some sectors to set a demanding but achievable target along this path, for example targets for housing and schools could be informed by Passivhaus. In others, a review of existing best practice may be needed, and CIBSE would be happy to support this using its experience of building performance and benchmarking. Targets in subsequent reviews should follow the overall direction of travel, but they could also be adjusted to a small extent using learnings gathered from operational performance disclosure (see details in §3.2.13).
- §3.2.10 - **Elemental or systems performance targets:** these would need to be tighter and more expansive than the current ones in Criterion 2. While there are advantages to this method for small simple projects (including refurbishments), we would not recommend this approach for all project types.

§3.2.11 - **International comparison:** As noted above, we should review how other European member states address this, and also look outside Europe for other examples.

COMPLIANCE ROUTE

§3.2.12 - On the **importance of enforcement**, see §2.1.

§3.2.13 - We strongly encourage a gradual transition to regulations based on **operational outcomes** (i.e. carbon and energy metrics), rather than on design and practical completion calculations. *Note - In*

principle, this shift is aligned with the focus on achieving safe operational outcomes emphasised in the Review of Building Regulations and Fire Safety.

§3.2.14 - We acknowledge this would require a combination of skills and expertise, and careful consideration of possible legal implications (e.g. to take account of the impact of occupants on overall building performance). However, we think that if the government's Grand Challenge and the UK's carbon targets are going to be met, we have to develop an approach that effectively drives down real energy use at the meter, and not just design calculations. We would therefore recommend a **step-by-step approach allowing gradual upskilling and knowledge gathering**, while catering for the wide variety of projects subject to Building Regulations:

- §3.2.15 – As first step there should be a requirement to **disclose operational outcomes** (without them being tied to a target or penalty). While we acknowledge this may currently fall outside the scope of Building Regulations and therefore may not be possible to introduce in the immediate review of Part L, we recommend a review of options is carried out as soon as possible to identify how such a requirement could be introduced subsequently. Disclosure would raise awareness of performance among the industry and allow the gathering of information about the performance of different project types. Varying levels of disclosure could be explored, but at the very minimum the data should be fed to an overall database which would be available for public interrogation (if needed with anonymized projects) and lessons gathering, including best practice and trends. Simplistically, this could be similar to the current Landmark Registry of Display Energy Certificates, albeit with much improved functionality for the data to be easily accessible and useful.
- §3.2.16 - In the immediate term, there should also be more **performance verification of individual elements and systems**, such as U-values and systems efficiency (heating, cooling, ventilation), expanding on the current requirements for airtightness testing. This is essential if the performance of new buildings is based on calculations and design data – the actual performance is only as good as the delivery of the building according to the detailed design. As noted in the Independent Review, there are a number of issues to be addressed here that fall outside the scope of Part L, but are essential to better achievement of the requirements of Part L. This is a crucial step to drive better quality of construction, and prevent over-optimistic assumptions in compliance models. Projects which opt to avoid performance testing could be applied a penalty on the given untested elements, in a similar way as for airtightness in new residential dwellings under the current Part L.
- §3.2.17 - The **direction of travel** towards operational outcomes should be made clear as soon as possible, with clear steps announced in advance, in order to encourage leadership from early adopters and allow the industry to build skills and knowledge. In the intermediate term, an option could be that projects would be free (and possibly incentivised) to choose a compliance route based on demonstrating operational outcomes, even if other compliance routes remained available.

3.3 - ADDITIONAL COMMENTS

§3.3.1 - The following points are summarised and not exhaustive. We have gathered significant industry feedback and would be happy to provide more detail to MHCLG:

§3.3.2 - **Works to existing buildings**: There is widespread feedback that the guidance in Approved Documents ADL-1B and ADL-2B is not onerous enough and is poorly implemented, in particular with regards to consequential improvements. This is a significant missed opportunity to improve the existing stock; since building works are disruptive and expensive, their potential to deliver energy and carbon savings and occupant comfort improvements must be maximised. Reference could be made to PAS 2030 and 2035 when specifying energy efficiency improvements.

§3.3.3 – **Notional building approach**: While we understand the pros and cons of different approaches to target setting, we believe there are significant **missed opportunities and potential perverse outcomes** to the notional building approach:

- §3.3.4 - The notional building is set-up to have the same shape as the building being assessed under Part L. This represents significant missed opportunities to address form efficiency, a fundamental part of passive design. Furthermore, it can have perverse outcome as, under the

current set-up, an inefficient shape with extensive envelope area has, effectively, more opportunities for improvements over the notional building (i.e. more area to improve on through insulation), compared to a form that would have reduced heat loss in the first place.

- §3.3.5 - Similarly, the notional building has the same orientation and internal building layout as the building being assessed. While we recognise that some sites are constrained, this again misses opportunities to encourage consideration of building orientation, and of the location of particular uses within a given form and orientation (e.g. locating where possible rooms according to their need for daylight, their cooling needs etc).
- §3.3.6 - Other missed opportunities currently exist in the notional building approach, particularly around how buildings are serviced. For example, areas allocated cooling in the assessed building also are in the notional building, and improvements over Part L can be achieved by specifying better cooling systems than the notional building, without incentive for reducing cooling need in the first place.

§3.3.7 - Altogether, these mean that, when comparing two buildings of similar uses, **"better performance under Part L" does not necessarily mean "lower expected carbon emissions":** a lower-carbon building could actually be seen to perform less well under Part L because, through strategic design decisions, its notional building was lower-carbon, and therefore it was subject to a lower target. This is obviously very counter-productive in terms of reducing carbon emissions; it also complicates and confuses the message on low-carbon strategies, encouraging compliance-driven approaches (possibly using loopholes) rather than a focus on reducing energy use and carbon emissions. While some of the above drawbacks may at least partly be addressed through revising how the notional building is set-up, we think that other points are drawbacks inherent to the approach, hence our recommendation for alternative methods to be reviewed, as detailed in §3.2.7 to §3.2.11.

§3.3.8 - The approach to **buildings which are not fully fitted-out** (e.g. "core & shell" speculative offices) needs to be reviewed, as it currently allows beneficial assumptions to be made by the initial applicant to Building Control, with very limited checks on the actual future fit-out. Options include, for example, reviewing the default assumptions for the fit-out elements that are not yet known, and/or expanding the minimum elemental performance requirements for shell & core elements. As a separate but related point, we would note that the rules for provision of EPCs of shell and core and fitted out spaces would benefit from further consideration**.**

§3.3.9 - **The carbon factor for grid electricity** should be updated to be more reflective of actual carbon emissions; it is currently 0.519kgCO_2/kWh i.e. over twice the 2017 average of 0.237 kgCO_2/kWh[5]. This can lead to decisions with detrimental long-term carbon outcomes. We welcome the fact that this recommendation has been taken into account in the draft revised SAP methodology which will take effect with the revised Part L[6]. In the future there should be clearer and more regular review mechanisms; note our recommendation in §3.5 to introduce "metered energy" requirements alongside carbon would encourage reductions to energy consumption in the first place, rendering designs more robust and less dependent on fluctuations of the grid carbon content.

§3.3.10 - In order to better reflect actual carbon emissions and encourage demand management, there should be a review of whether the current system of factors adequately balances average and peak conditions (and their timing in relation to actual peak demand, on a daily and seasonal basis), and consider a move to more **dynamic carbon factors and targets** in the medium term**;** future grid decarbonisation scenarios could also be considered, for example following the methodology established by BEIS for work under the Heat Networks Delivery Unit.

§3.3.11 - **Fuel factors** currently provide an allowance for higher carbon emissions for buildings heated by oil and LPG: for example, buildings heated by oil boilers are allowed heating emissions that are 17% higher than those heated by gas. While we understand the desire to accommodate constraints in buildings not connected to the gas grid, there are now alternative systems available and the current allowance is inconsistent with the intended direction of travel; buildings should be evaluated on their own merit i.e. their overall carbon emissions performance.

[5] http://electricinsights.co.uk/#/reports/report-2017-q4/detail/carbon-emissions-down-12?_k=ewxyjo
[6] http://files.bregroup.com/SAP/SAP-10.0_24-07-2018.pdf

§3.3.12 – Within the notional building approach, **National Calculation Methodology profiles and assumptions** need to be reviewed; for example, there are building types where they lead to high perceived hot water requirements, which tend to over-estimate the potential for combined heat & power.

4 - INDOOR AIR QUALITY

4.1 – CONTEXT: CURRENT APPROACH AND THE NEED FOR CHANGE

§4.1.1 - This paper does not expand on the rationale for considering indoor air quality as part of Building Regulations: the effects of air pollution on health, and the fact that most people spend the majority of their time indoors, are well-documented elsewhere. The focus here is how indoor air quality is currently addressed in Building Regulations and associated guidance, and recommendations for reviewing and improving this.

§4.1.2 - Although there has been no such commitment by government so far, CIBSE believe the Part L review should be accompanied by a review of Part F, due to a number of drivers:

- §4.1.3 - Recent amendments to the Energy Performance of Buildings Directive, which the UK is currently committed to implement, despite exiting the EU[7]. These amendments emphasise the need for indoor air quality and comfort to be considered as part of national energy efficiency regulations.
- §4.1.4 - Growing attention to air quality, including from the 2016 Royal College of Physicians report[8], DEFRA Clean Air Strategy 2018 consultation[9], and calls from the UK-Indoor Environment Group (among many others).
- §4.1.5 - Increased calls for energy efficiency improvements to existing buildings, and the intrinsic link between Part L and Part F; while we very much call for such retrofit programmes, this should not be to the detriment of health and comfort, for example if they led to insufficient ventilation and prompted mould growth.

§4.1.6 - There is currently **no comprehensive regulatory framework on indoor air quality**, and a widespread concern about poor implementation of the guidelines in Building Regulations Approved Document F.

§4.1.7 - Building Regulations Schedule 1, Part F states that "*there shall be adequate means of ventilation provided for people in the building".* This means that ventilation is being used as a proxy for indoor air quality.

- §4.1.8 - The **Building Regulations** do not appropriately address air quality, since ventilation alone is no guarantee of indoor air quality. What constitutes "adequate" ventilation is not defined; in practice it is often related only to ventilation *rates* aimed at the removal of odours and indoor pollutants, especially moisture, without addressing the impact of *outdoor pollutants* on the indoor environment. In simple terms, this means that under the current building regulations, ventilation bringing polluted outdoor air indoors is compliant.
- §4.1.9 - The guidance in **Approved Document F** (section 4.6) states that "*Ventilation is simply the removal of 'stale' indoor air from a building and its replacement with 'fresh' outside air. It is assumed within the Approved Document that the outside air is of reasonable quality*". This assumption is clearly not correct in many areas of the country. Appendix D offers guidance on limiting the ingress of external pollution in urban areas, however this is advisory only; the Appendix is not even referenced in the main document, and there is therefore no prompt to

[7] Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 *amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency* https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0844&from=EN
[8] RCP and RCPCH, "*Every breath we take – the lifelong impact of air pollution*", 2016
[9] https://consult.defra.gov.uk/environmental-quality/clean-air-strategy-consultation/

readers as to when it should be read and followed. We are aware from industry feedback that its guidance is very often not applied.

- §4.1.10 - Appendix A of **Approved Document F** also offers performance criteria for ozone and NO_2 levels (for projects following a performance-based ventilation route), however these are intended to address pollution from indoor sources and it is clear from industry feedback that these performance criteria are rarely applied and enforced in practice.
- §4.1.11 - Furthermore, requirements do not address indoor pollutants in a comprehensive manner; for example, they do not specifically address formaldehyde, a known harmful pollutant from building materials and products; the existing guideline refers to "total VOCs"; many VOCs are not harmful, while formaldehyde is a known carcinogen. There is no allowance for the significant increase in the use of polymers and manufactured organic based materials in internal finishes, flooring, other internal products and decoration materials.

4.2 – RECOMMENDATIONS

§4.2.1 - We strongly recommend a **more comprehensive approach to indoor air quality in Building Regulations and associated guidance; this should include:**

§4.2.2 – We recommend in the immediate term a review of **Building Regulations Part F so that its purpose is clearly indoor air quality**, rather than ventilation alone; the performance requirements should be health-based criteria i.e. limits to indoor pollutant levels; these limits should be based on WHO guidelines (or other health-based criteria recommended by Public Health England)

§4.2.3 – We recommend in the immediate term a review of associated guidance to consider holistically the factors that affect indoor air quality including outdoor sources, ventilation systems, and indoor sources:

- §4.2.4 – Guidance on how to **limit the impact of outdoor air pollution** on the indoor environment including location of openings and other air inlets, and filtration.
- §4.2.5 – More guidance on **low-emitting materials**; the current AD, from 2006, states that "*Source control is not considered within the main guidance of the Approved Document owing to limited knowledge about the emission of pollutants from construction and consumer products used in buildings and the lack of suitable labelling schemes for England and Wales*". We believe this is very much in need of a review as emission standards and labels have now become much more widespread; furthermore, referring to them in AD-F would help support their wider adoption, as evidenced in European countries which have put in place requirements and enforcement regimes on this issue. We think it would be appropriate to refer to such standards in AD-F as part of the measures that should be adopted, possibly also with the use of a "traffic-light system" for categories of emission levels, as suggested in DEFRA's recent Clean Air Strategy consultation.
- §4.2.6 – We stress the need for better enforcement to limit risks from carbon monoxide and other combustion pollutants: see our comments elsewhere in this document. This should also be linked to the ongoing consideration of the requirements for alarms in residential buildings.

§4.2.7 - A **stepped approach could be adopted in terms of evidence requirements and post-completion testing**, based on a risk assessment depending on project characteristics such as location, type of use, and scale; initial suggestions (to be developed with MHCLG and other parties) include: buildings in Air Quality Management Areas should demonstrate through design evidence and possibly modelling (at design and as-built stages) how the ventilation strategy seeks to limit the ingress of outdoor pollutants, and they may be subject to indoor testing of pollutants such as particulate matters or nitrous oxide; buildings which cannot provide confirmation of using a majority of low-emitting materials may be subject to testing of key pollutants from indoor materials, such as formaldehyde. In all cases, commissioning requirements should apply and be better enforced – see recommendations below in section 4.3.

§4.2.8 - We would point to references such as the recent ISO 17772:2017, developed with the purpose of supporting the consideration of the indoor environment in regulations (and intended to

work alongside energy regulations); guidance from organisations such as Public Health England and the UK-IEG group; the recently revised BB101 from the Department for Education; existing CIBSE guidance including AM10, and the upcoming revised CIBSE TM40 Health and Wellbeing. MHCLG may also find it useful to review international best practice examples, such as from Finland and France (particularly on products emissions standards), the Netherlands (ventilation), and Japan (indoor air quality).

§4.2.9 - In the longer-term and similarly to our recommendation on energy and carbon, requirements could in the future be linked to **monitoring of actual indoor air quality performance** in use. We acknowledge this may not be appropriate to incorporate in the immediate review, but would like to point towards this direction for consideration.

§4.2.10 - There should be more attention to **noise from ventilation systems**, particularly where this may disturb sleep e.g. residences (and where occupants may otherwise switch off their ventilation systems and compromise indoor air quality and overheating risk). While some of this may be addressed through our general recommendations for better installation and commissioning, we would refer to specialists such as the Association of Noise Consultants and Institute of Acoustics for detailed guidance on design measures and criteria.

§4.2.11 - MHCLG should work with Public Health England to support a **programme of research** on areas such as: strategies and materials to improve the energy efficiency of existing buildings without detriments to indoor air quality; impact of fire retardant materials on indoor air quality and on the health of fire prevention professionals;

§4.2.12 - We would be happy to **support MHCLG in developing the requirements and associated guidance**.

4.3 - ADDITIONAL RECOMMENDATIONS

§4.3.1 - Notwithstanding the above recommendations for substantial changes, we would like to make the following recommendations for smaller but nonetheless important changes to the current guidance:

- §4.3.2 - As per our general comment in §2.2, we highlight the poor **enforcement** of Building Regulations and associated guidance; any changes would <u>further</u> require adequate **resources and training to building control bodies**. This is also treated in detail in the Independent Review. In particular, there is widespread evidence of poor design, installation, and commissioning of **ventilation systems**, leading to a range of performance issues including insufficient ventilation rates. This includes mechanical but also natural ventilation systems (e.g. sizes of openings, intermittent extract fans). While this paper focuses on improvements to regulations and guidance, this does not diminish the need for better enforcement of current requirements; this is also an area where multiple benefits could be obtained as, for example, better installed, commissioned and maintained system will be more likely to deliver good indoor air quality in an energy-efficient manner (and probably also be less noisy and less likely to disturb occupants, including at night-time for sleep). If mechanical ventilation and heat recovery continues to be widespread in new buildings, then it needs to be delivered in a way that meets not only the energy, carbon and indoor air quality requirements, but is also acoustically compliant and acceptable.
- §4.3.3 - Review the rationale behind recommended ventilation rates in AD-F, to take account of indoor pollutants as well as comfort and energy efficiency requirements;
- §4.3.4 - Better AD-F guidance for naturally ventilated non-domestic buildings: the reliance on opening windows and lack of requirement for trickle vents means that, in winter, ventilation rates are often limited due to occupant discomfort if they open windows;
- §4.3.5 - The AD should require pressure drops to be included in the calculation of ventilation rates; we have received significant feedback that this is often neglected and is one of the reasons for insufficient ventilation rates being delivered in practice;

5 – OVERHEATING RISK

5.1 – CONTEXT: CURRENT APPROACH AND THE NEED FOR CHANGE

§5.1.1 - CIBSE believe that **overheating risk is not adequately addressed in the current policy and regulatory framework**, including Building Regulations.

§5.1.2 - This is the case for the current **and** future climate. Current government policies, including Part L, encourage the design of highly insulated and airtight buildings that minimise winter heat losses and reduce heating demand. This could mean that buildings, without an appropriate ventilation strategy, are more exposed to overheating in the summer. Adding to that the intense urbanisation of cities and the warming climate, means that overheating is a real threat to occupant health and wellbeing.

§5.1.3 - The treatment of overheating at design stage is fundamental in increasing the resilience of buildings in hot events, now and in the future. There are many passive solutions to increase the resilience at design stage but much fewer, and usually more expensive options with an energy and carbon emissions penalty, for existing buildings that overheat. The common approach is the installation of air conditioning units that result in the increase of the carbon emissions of the building, increased running costs, and increased demand on the electricity grid, and also contribute to the urban heat island effect in cities.

§5.1.4 - Part L of the Building Regulations itself does not mention overheating; while overheating is to some extent addressed in the Approved Documents (albeit inadequately – see details below), these documents are guidance only and we believe widely ignored:

- §5.1.5 - The Approved Document accompanying Part L of Building Regulations for buildings other than dwellings requires the consideration of solar heat gains in the summer (Criterion 3) and provides guidelines for appropriate levels of solar gains and thermal characteristics of glazing – this is a simple criterion that only addresses limits to solar gains, not other contributing factors which are within the control of designers, such as ventilation to dissipate heat gains (whether mechanical or natural), nor heat gains from heat distribution.
- §5.1.6 - The Approved Document accompanying Part L for dwellings provides a test (SAP Appendix P), which is simplistic in its approach and assumptions (we note the proposed changes in the draft SAP revision published this summer; these are welcome as they would make the test more robust but we note the BRE themselves highlight that Appendix P testing should not be relied upon to assess thermal comfort).
- §5.1.7 - Since the 2006 edition of Part L for new buildings (L2A section 4, criterion 3) which included the assessment of thermal comfort based on specific criteria, the subsequent 2010 and 2013 editions of Part L have represented a downgrading of the treatment as they require consideration of solar gains only, which results in reducing the importance of overheating risk. In addition, the guidance methodology is also weak.

§5.1.8 - We therefore believe that **the current approach is not sufficient for identifying either current or future levels of overheating risk in buildings**.

§5.1.9 - For details, please refer to our submissions to the 2018 Environmental Audit Committee inquiry on heatwaves:

- Written evidence: http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/heatwaves-adapting-to-climate-change/written/86448.html
- oral evidence (transcript): http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environmental-audit-committee/heatwaves-adapting-to-climate-change/oral/82876.html .

5.2 - RECOMMENDATIONS

§5.2.1 - There **needs to be a regulatory requirement for overheating risk** to be assessed and addressed in the Building Regulations, under current and future climates.

§5.2.2 - Overheating is a dynamic phenomenon that requires a dynamic approach in the way it is assessed. Dynamic Simulation Models (DSMs), routinely used by industry professionals to assess building thermal and energy performance, provide such a dynamic environment. Using DSMs, the hourly thermal performance of the building can be assessed, under current and future climates, and as a result various mitigation options and their effectiveness can be assessed. We acknowledge that compliance tests for acceptable DSM should be created under such an approach, and also that dynamic modelling may not be required nor appropriate in all projects**. A stepped approach could therefore be followed, with a simple assessment triggering (or not) the need for full simulation**; this should be adopted in the immediate term and could be part of an overall requirement that the thermal and energy performance of buildings should be assessed in a holistic way for both winter and summer conditions. This way design solutions could achieve year-round performance and minimise thermal risks as well as energy use and carbon emissions.

§5.2.3 - In addition, we believe the introduction of the following requirements should be reviewed:

- §5.2.4 - Immediate term (i.e. this review): As proxy, defining overheating as a need for cooling, and introducing a cap in the energy used for cooling in non-domestic buildings following a cooling load assessment, which could link with energy and carbon requirements of Part L. Under this approach, residences and non-domestic buildings not provided with cooling would need to demonstrate there is no requirement for cooling. This could also be linked to requirements for air-conditioning inspections under the EPB Regulations.

- §5.2.5 - Medium term: A more sophisticated Appendix P of SAP based on a database of modelled architypes (based on TM59)

OTHER RECOMMENDATIONS

§5.2.6 – We recommend the introduction of an evaluation of overheating risk as part of the planning process, as this is the right time to carry out an initial assessment of the strategic features that increase overheating risk (e.g. site location, building layout, façade), and to introduce mitigation measures. We realise this sits outside of Building Regulations and would not capture all types of building works, but think it is worth raising here nonetheless.